A.F. OUTPUT PENTODE

Pentode intended for use as A.F. power amplifier.

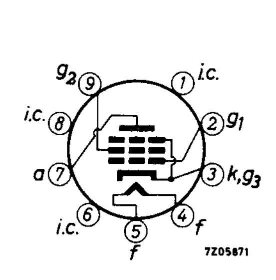
QUICK REFERENCE DATA			
Anode current	I_a	48	mA
Transconductance	S	11.3	mA/V
Amplification factor	$\mu_{g_2g_1}$	19	
Output power	W_o	6.0	W

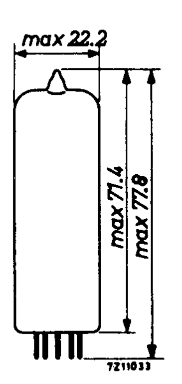
HEATING: Indirect by A.C. or D.C.; parallel supply

Heater voltage	V_f	6.3	V
Heater current	I_f	760	mA

DIMENSIONS AND CONNECTIONS Dimensions in mm

Base: Noval





CAPACITANCES

Anode to all except grid No.1	$C_{a(g_1)}$	6.5	pF
Grid No.1 to all except anode	$C_{g_1(a)}$	10.8	pF
Anode to grid No.1	C_{ag_1}	max. 0.5	pF
Grid No.1 to heater	C_{g_1f}	max. 0.25	pF

OPERATING CHARACTERISTICS

Class A

Anode voltage	V_a			250			V
Grid No.2 voltage	V_{g_2}			250			V
Grid No.1 voltage	V_{g_1}			-7.3			V
Cathode resistor	R_k			135			Ω
Load resistance	$R_{a\sim}$			5.2			kΩ
Grid No.1 driving voltage	V_i	0	0.3	3.4	4.3	4.7 [2]	V_{RMS}
Anode current	I_a	48	-	-	49.5	49.2	mA
Grid No.2 current	I_{g_2}	5.5	-	-	10.8	11.6	mA
Transconductance	S	11.3	-	-	-	-	mA/V
Amplification factor	$\mu_{g_2g_1}$	19	-	-	-	-	
Internal resistance	R_i	38	-	-	-	-	kΩ
Output power	W_o [1]	0	0.05	4.5	5.7	6.0	W
Distortion, total	d_{tot} [1]	-	-	6.8	10	-	%
second harmonic	d_2 [1]	-	-	3.0	2.0	-	%
third harmonic	d_3 [1]	-	-	5.8	9.5	-	%

Anode voltage	V_a			250			V
Grid No.2 voltage	V_{g_2}			250			V
Grid No.1 voltage	V_{g_1}			-7.3			V
Cathode resistor	R_k			135			Ω
Load resistance	$R_{a\sim}$			4.5			kΩ
Grid No.1 driving voltage	V_i	0	0.3	3.5	4.4	4.8 [2]	V_{RMS}
Anode current	I_a	48	-	-	50.6	50.5	mA
Grid No.2 current	I_{g_2}	5.5	-	-	10	11	mA
Transconductance	S	11.3	-	-	-	-	mA/V
Amplification factor	$\mu_{g_2g_1}$	19	-	-	-	-	
Internal resistance	R_i	38	-	-	-	-	kΩ
Output power	W_o [1]	0	0.05	4.5	5.7	6.0	W
Distortion, total	d_{tot} [1]	-	-	7.5	10	-	%
second harmonic	d_2 [1]	-	-	5.7	5.0	-	%
third harmonic	d_3 [1]	-	-	4.5	8	-	%

[1]) Measured with fixed bias

[2]) At I_{g_1} = +0.3 μA

OPERATING CHARACTERISTICS (continued)

Class A (continued)

Anode voltage	V_a	250				V
Grid No.2 voltage	V_{g_2}	250				V
Grid No.1 voltage	V_{g_1}	-8.4				V
Cathode resistor	R_k	210				Ω
Load resistance	$R_{a\sim}$	7				kΩ
Grid No.1 driving voltage	V_i	0	0.3	3.5	5.5 2)	V_{RMS}
Anode current	I_a	36	-	36.8	36	mA
Grid No.2 current	I_{g_2}	4.1	-	8.5	14.6	mA
Transconductance	S	10	-	-	-	mA/V
Amplification factor	$\mu_{g_2g_1}$	19	-	-	-	
Internal resistance	R_i	40	-	-	-	kΩ
Output power	W_o 1)	0	0.05	4.2	5.6	W
Distortion, total	d_{tot} 1)	-	-	10	-	%
second harmonic	d_2 1)	-	-	1.7	-	%
third harmonic	d_3 1)	-	-	8.7	-	%

Anode voltage	V_a	250				V
Grid No.2 voltage	V_{g_2}	210				V
Grid No.1 voltage	V_{g_1}	-6.4				V
Cathode resistor	R_k	160				Ω
Load resistance	$R_{a\sim}$	7				kΩ
Grid No.1 driving voltage	V_i	0	0.3	3.4	3.8 2)	V_{RMS}
Anode current	I_a	36	-	36.6	36.5	mA
Grid No.2 current	I_{g_2}	3.9	-	7.3	8.0	mA
Transconductance	S	10.4	-	-	-	mA/V
Amplification factor	$\mu_{g_2g_1}$	19	-	-	-	
Internal resistance	R_i	40	-	-	-	kΩ
Output power	W_o 1)	0	0.05	4.3	4.7	W
Distortion, total	d_{tot} 1)	-	-	10	-	%
second harmonic	d_2 1)	-	-	1.8	-	%
third harmonic	d_3 1)	-	-	9.3	-	%

1) Measured with fixed bias
2) At I_{g_1} = +0.3 μA

OPERATING CHARACTERISTICS (continued)

Class B, two tubes in push-pull

Anode voltage	V_a	250		300		V
Grid No.2 voltage	V_{g_2}	250		300		V
Grid No.1 voltage	V_{g_1}	-11.6		-14.7		V
Load resistance	$R_{aa\sim}$	8		8		kΩ
Grid No.1 driving voltage	V_i	0	8	0	10	V_{RMS}
Anode current	I_a	2x10	2x37.5	2x7.5	2x46	mA
Grid No.2 current	I_{g_2}	2x1.1	2x7.5	2x0.8	2x11	mA
Output power	W_o	0	11	0	17	W
Distortion	d_{tot}	-	3	-	4	%

Class AB, two tubes in push-pull

Anode voltage	V_a	250		300		V
Grid No.2 voltage	V_{g_2}	250		300		V
Common cathode resistor	R_k	130		130		Ω
Load resistance	$R_{aa\sim}$	8		8		kΩ
Grid No.1 driving voltage	V_i	0	8	0	10	V_{RMS}
Anode current	I_a	2x31	2x37.5	2x36	2x46	mA
Grid No.2 current	I_{g_2}	2x3.5	2x7.5	2x4	2x11	mA
Output power	W_o	0	11	0	17	W
Distortion	d_{tot}	-	3	-	4	%

OPERATING CHARACTERISTICS IN TRIODE CONNECTION
(g_2 connected to a)

Class A

Anode voltage	V_a		250		V
Cathode resistor	R_k		270		Ω
Load resistance	$R_{a\sim}$		3.5		kΩ
Grid No.1 driving voltage	V_i	0	1.0	6.7	V_{RMS}
Anode current	I_a	34	–	36	mA
Output power	W_o	–	0.05	1.95	W
Distortion	d_{tot}	–	–	9	%

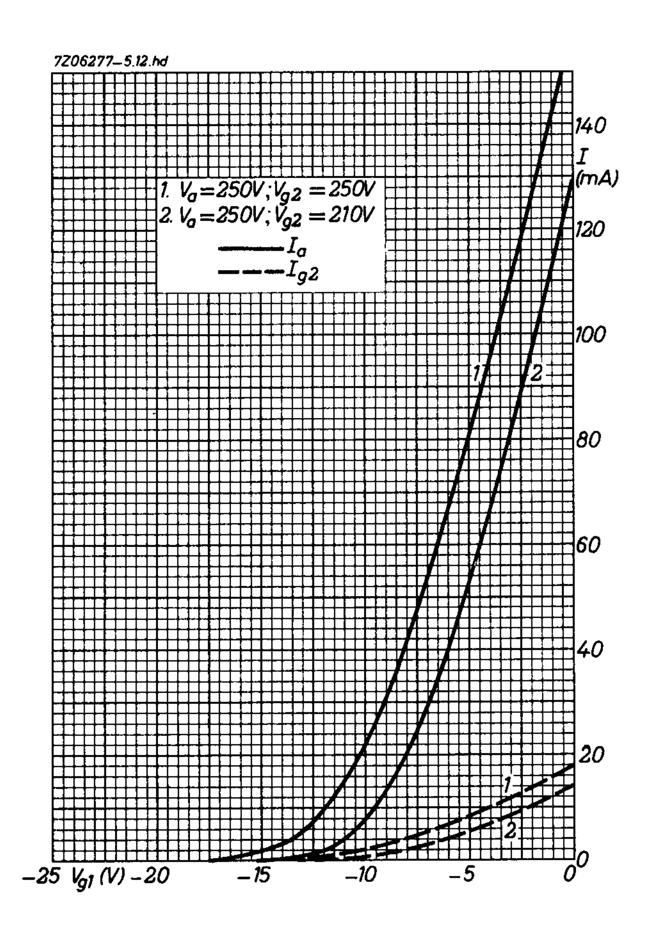
Class AB, two tubes in push-pull

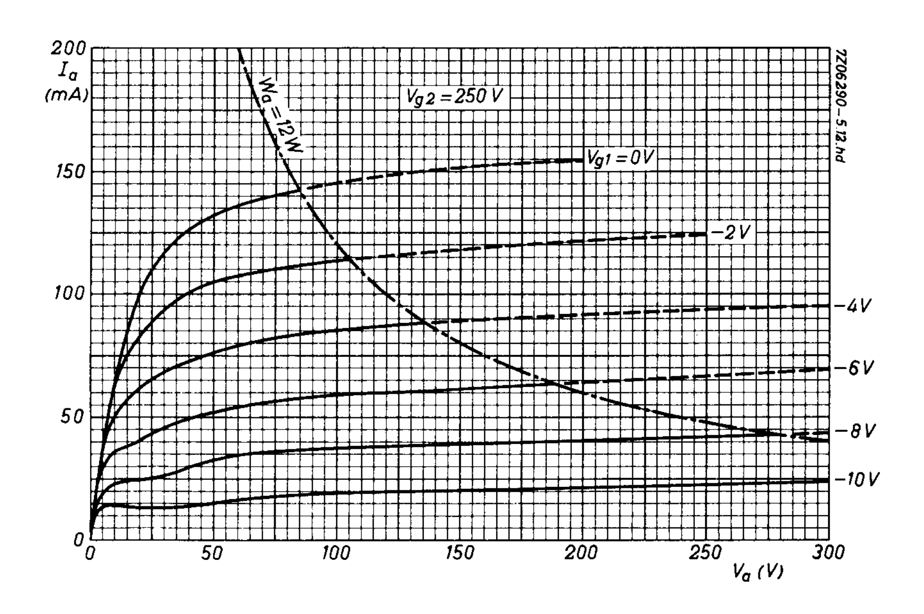
Anode voltage	V_a	250		300		V
Common cathode resistor	R_k	270		270		Ω
Load resistance	$R_{aa\sim}$	10		10		kΩ
Grid No.1 driving voltage	V_i	0	8.3	0	10	V_{RMS}
Anode current	I_a	2x20	2x21.7	2x24	2x26	mA
Output power	W_o	0	3.4	0	5.2	W
Distortion	d_{tot}	–	2.5	–	2.5	%
Grid No.1 driving voltage for W_o = 50 mW	V_i	0.95		0.9		V_{RMS}

LIMITING VALUES (Design centre rating system)

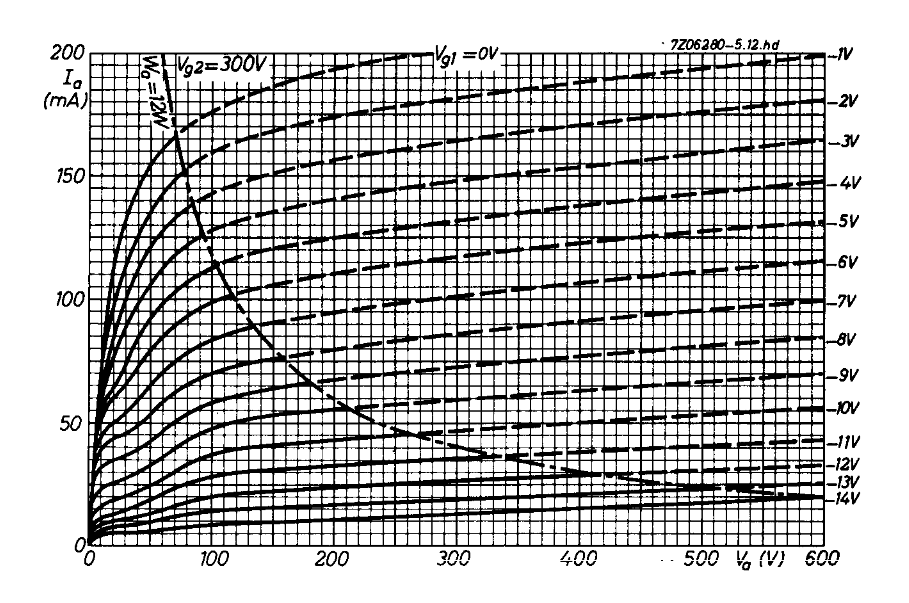
Anode voltage	V_{a_o}	max.	550	V
	V_a	max.	300	V [1]
Anode dissipation	W_a	max.	12	W [1]
Grid No.2 voltage	$V_{g_{2o}}$	max.	550	V
	V_{g_2}	max.	300	V [1]
Grid No.2 dissipation	W_{g_2}	max.	2	W
	$W_{g_{2p}}$	max.	4	W
Grid No.1 voltage	$-V_{g_1}$	max.	100	V
Cathode current	I_k	max.	65	mA
Grid No.1 resistor				
for automatic bias	R_{g_1}	max.	1	MΩ
for fixed bias	R_{g_1}	max.	0.3	MΩ
Cathode to heater voltage	V_{kf}	max.	100	V

[1]) When the heater and positive voltages are obtained from a storage battery by means of a vibrator, the max. values of V_a and V_{g_2} are 250 V and that of W_a is 9 W.

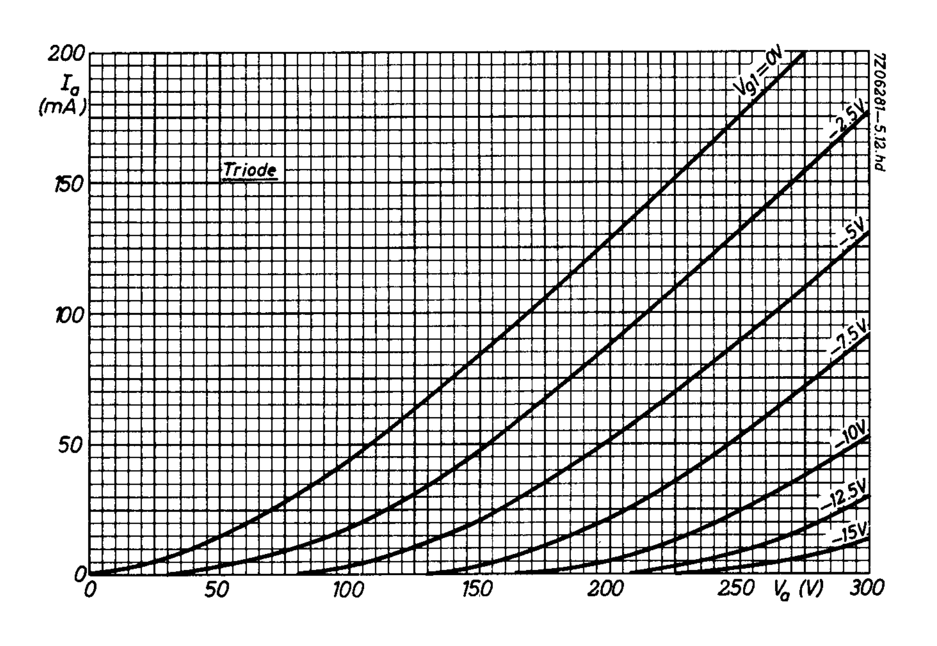

7Z06277-5.12.hd
1. V_a=250V; V_{g2} =250V
2. V_a=250V; V_{g2} =210V
I_a
I_{g2}
140
I
(mA)
120
100
80
60
40
20
0
1
2
1
2
-25
V_{g1} (V)
-20
-15
-10
-5
0



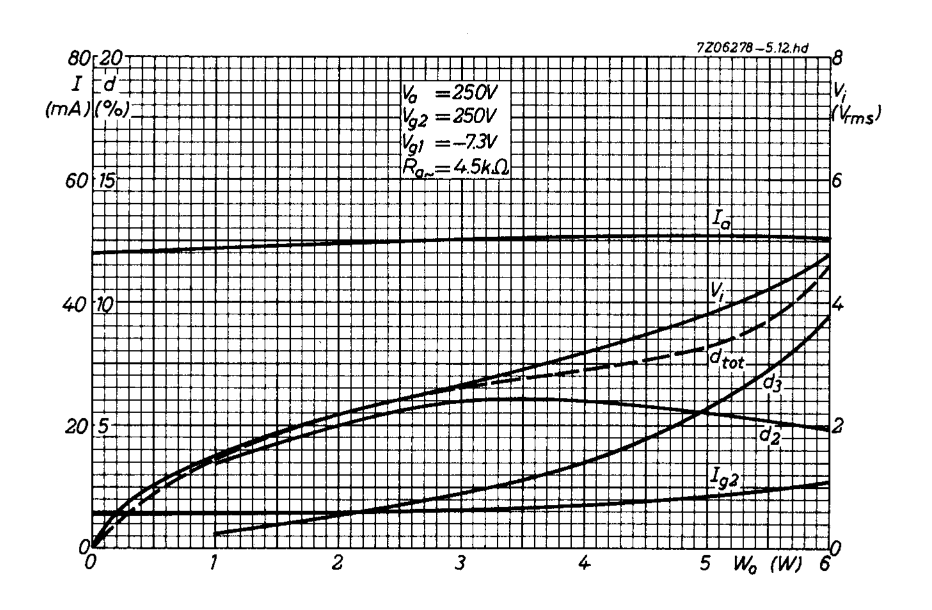
200
I_a
(mA)
150
100
50
0
0
50
100
150
200
250
300
V_a (V)
$W_a = 12W$
$V_{g2} = 250V$
$V_{g1} = 0V$
−2V
−4V
−6V
−8V
−10V
7Z06290−5.12.hd

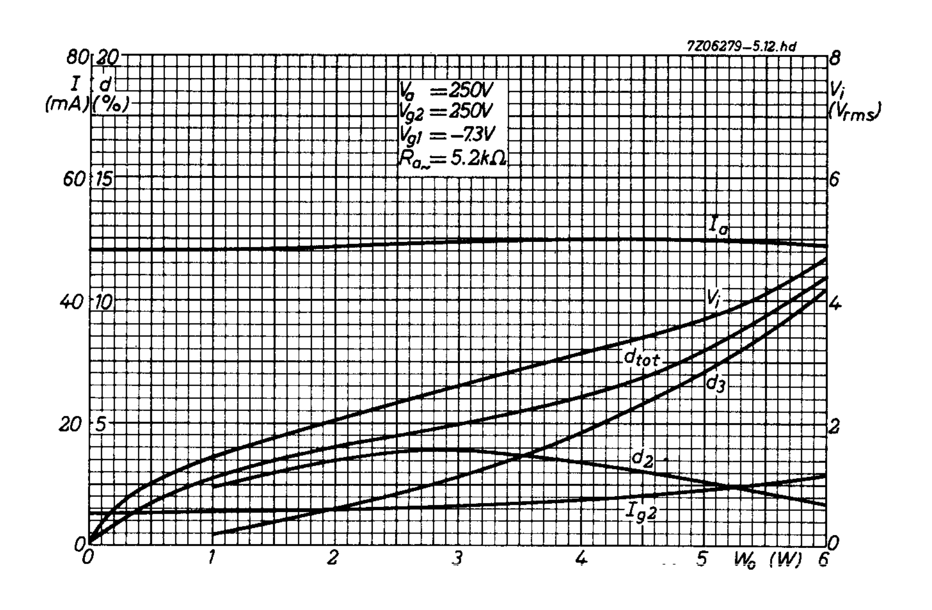


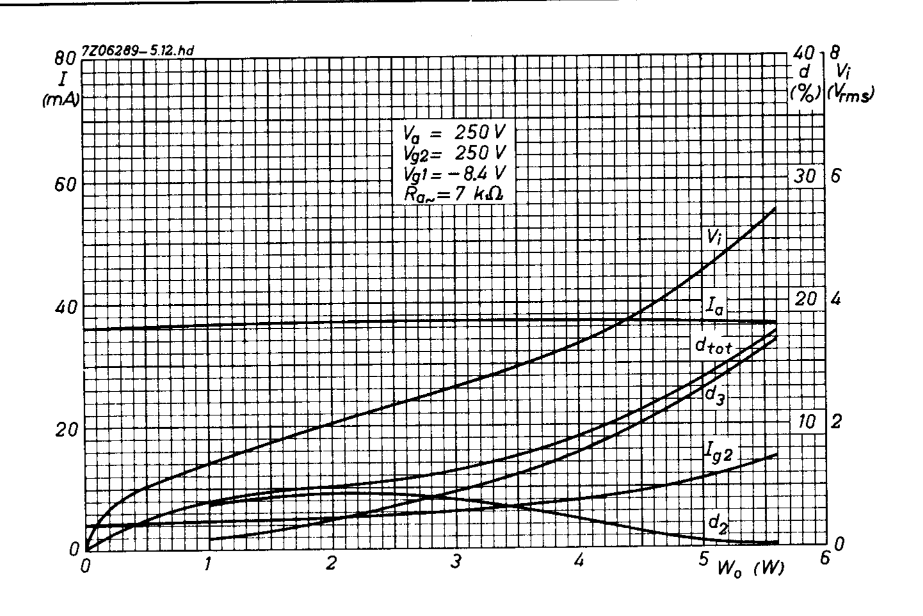
200
I_a
(mA)
150
100
50
0
0
100
200
300
400
500
V_a (V)
600
$W_a = 12W$
$V_{g2}=300V$
$V_{g1} = 0V$
7Z06280-5.12.hd
−1V
−2V
−3V
−4V
−5V
−6V
−7V
−8V
−9V
−10V
−11V
−12V
−13V
−14V

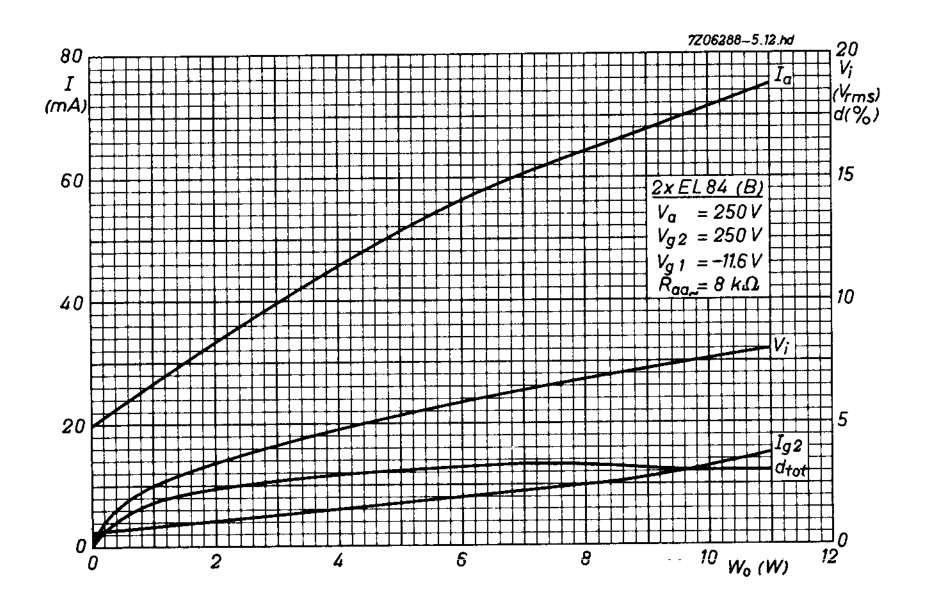


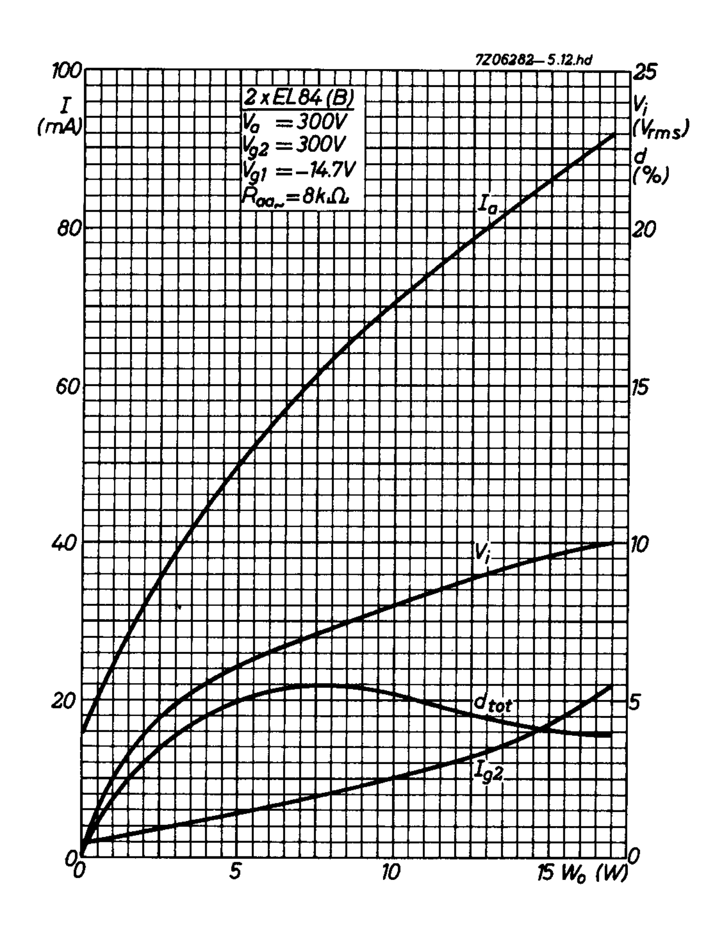
200
I_a
(mA)
150
100
50
0
Triode
Vg1=0V
-2.5V
-5V
-7.5V
-10V
-12.5V
-15V
0
50
100
150
200
250
V_a (V)
300
7Z06281-5.12.hd

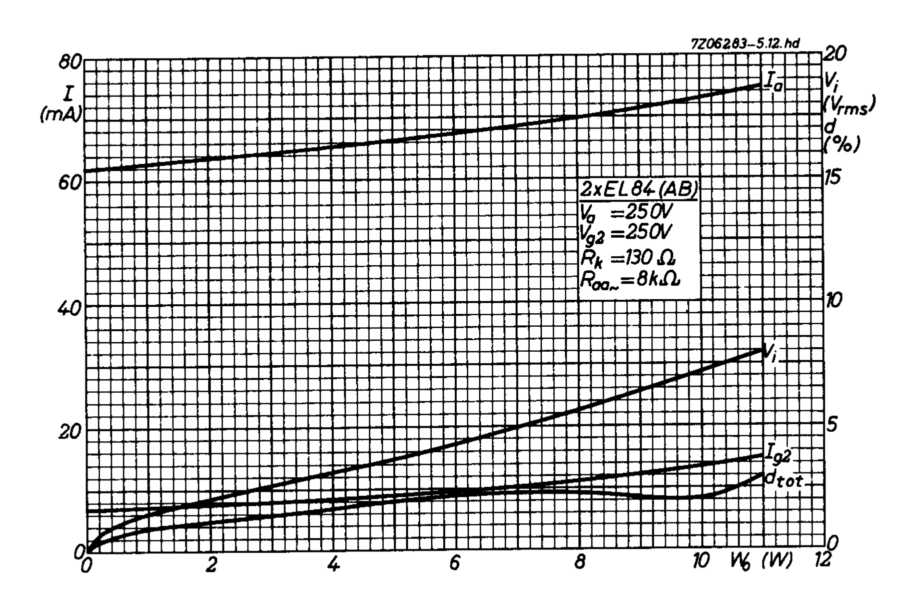

7Z06278-5.12.hd
V_a =250V
V_{g2} =250V
V_{g1} =−7.3V
$R_{a\sim}$=4.5kΩ
I (mA)
d (%)
V_i (V_{rms})
I_a
V_i
d_{tot}
d_3
d_2
I_{g2}
W_o (W)
80 20 8
60 15 6
40 10 4
20 5 2
0 0 0
0 1 2 3 4 5 6

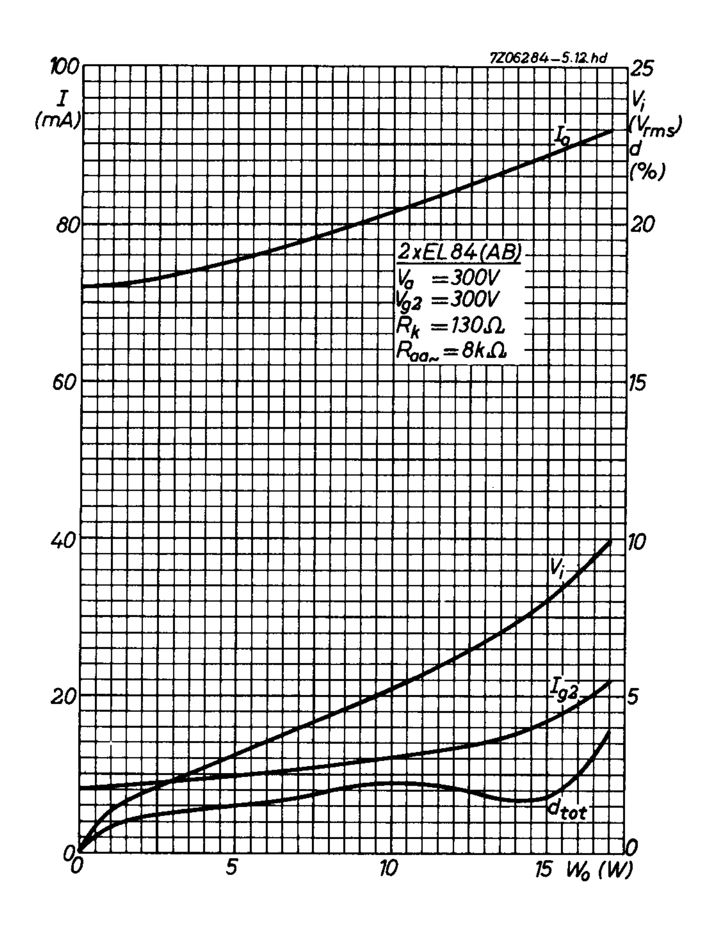

7Z06279-5.12.hd
V_a =250V
V_{g2} =250V
V_{g1} =−7.3V
$R_{a\sim}$=5.2kΩ
I (mA)
d (%)
V_i (V_{rms})
I_a
V_i
d_{tot}
d_3
d_2
I_{g2}
W_o (W)
80 20 8
60 15 6
40 10 4
20 5 2
0 0 0
0 1 2 3 4 5 6


7Z06289-5.12.hd
I
(mA)
d
(%)
V_i
(V_{rms})
V_a = 250 V
V_{g2} = 250 V
V_{g1} = −8.4 V
$R_{a\sim}$ = 7 kΩ
V_i
I_a
d_{tot}
d_3
I_{g2}
d_2
W_o (W)


7Z06288-5.12.hd
I
(mA)
V_i
(V_{rms})
d(%)
2x EL 84 (B)
V_a = 250 V
V_{g2} = 250 V
V_{g1} = −11.6 V
$R_{aa\sim}$ = 8 kΩ
I_a
V_i
I_{g2}
d_{tot}
W_o (W)


7Z06282–5.12.hd
2 x EL84 (B)
V_a = 300V
V_{g2} = 300V
V_{g1} = −14.7V
$R_{aa\sim}$ = 8kΩ
I (mA)
V_i (V_{rms})
d (%)
I_a
V_i
d_{tot}
I_{g2}
100
80
60
40
20
0
25
20
15
10
5
0
0
5
10
15 W_o (W)


7Z06283-5.12.hd
80
I
(mA)
60
40
20
0
20
V_i
(V_{rms})
d
(%)
15
10
5
0
I_a
2xEL84 (AB)
V_a =250V
V_{g2} =250V
R_k =130 Ω
$R_{aa\sim}$ =8kΩ
V_i
I_{g2}
d_{tot}
0
2
4
6
8
10
W_o (W)
12



7Z06284-5.12.hd
100
I
(mA)
80
60
40
20
0
25
V_i
(V_{rms})
d
(%)
20
15
10
5
0
I_a
2xEL84(AB)
V_a = 300V
V_{g2} = 300V
R_k = 130Ω
$R_{aa\sim}$ = 8kΩ
V_i
I_{g2}
d_{tot}
0
5
10
15
W_o (W)



EL84

page	sheet	date
1	1	1969.12
2	2	1969.01
3	3	1969.01
4	4	1969.01
5	5	1969.01
6	6	1969.01
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